

WHAT IS CLAIMED IS:

1. A corrected mask pattern verification apparatus for verifying that corrected mask pattern data generated based on design mask pattern data has been properly corrected, the corrected mask pattern verification apparatus comprising:

a graphic operation section for performing a prescribed graphic operation based on the design mask pattern data and the corrected mask pattern data so as to generate differential mask pattern data indicating a result of the prescribed graphic operation;

a graphic reduction-enlargement operation section for reducing the differential mask pattern data and enlarging the differential mask pattern data obtained by the reduction, and generating graphic reduction-enlargement operation data indicating a graphic reduction-enlargement operation result;

a first determination section for determining whether or not the graphic reduction-enlargement operation data includes the differential mask pattern, and generating first determination result data indicating a determination result thereof;

an area comparison operation section for

calculating an area of a differential mask pattern represented by the differential mask pattern data and comparing the calculated area with a prescribed area, and generating area comparison operation data indicating an area comparison operation result;

a second determination section for determining whether or not the area comparison operation data includes the differential mask pattern data and generating second determination result data indicating a determination result thereof; and

a third determination section for determining whether or not the corrected mask pattern data has been properly corrected based on the first determination result data and the second determination result data.

2. A corrected mask pattern verification apparatus according to claim 1, wherein the result of the prescribed graphic operation is a graphic difference obtained from the design mask pattern data and the corrected mask pattern data.

3. A corrected mask pattern verification apparatus according to claim 1, wherein the result of the prescribed graphic operation is a graphic exclusive-OR obtained from

the design mask pattern data and the corrected mask pattern data.

4. A corrected mask pattern verification method for verifying that corrected mask pattern data generated based on design mask pattern data has been properly corrected, the corrected mask pattern verification method, comprising:

(a) a first graphic differential operation step of deleting the design mask pattern data from the corrected mask pattern data, thereby generating first differential mask pattern data representing a first differential mask pattern;

(b) a first graphic reduction-enlargement operation step of performing a first reduction on the first differential mask pattern data and then performing a first enlargement on the first mask pattern data obtained by the first reduction, thereby generating first graphic reduction-enlargement operation data indicating a first graphic reduction-enlargement operation result;

(c) a first determination step of determining whether or not the first graphic reduction-enlargement operation data includes the first differential mask pattern data, thereby generating first determination

result data indicating a result thereof;

(d) a first area comparison operation step of calculating an area of the first differential mask pattern based on the first differential mask pattern data, and comparing the area of the first differential mask pattern with a first prescribed area, thereby generating first area comparison operation data indicating a result thereof;

(e) a second determination step of determining whether or not the first area comparison operation data includes the first differential mask pattern data, thereby generating second determination result data indicating a result thereof;

(f) a second graphic differential operation step of deleting the corrected mask pattern data from the design mask pattern data, thereby generating second differential mask pattern data representing a second differential mask pattern;

(g) a second graphic reduction-enlargement operation step of performing a second reduction on the second differential mask pattern data and then performing a second enlargement on the second mask pattern data obtained by the second reduction, thereby generating second graphic reduction-enlargement operation data

indicating a second graphic reduction-enlargement operation result;

(h) a third determination step of determining whether or not the second graphic reduction-enlargement operation data includes the second differential mask pattern data, thereby generating third determination result data indicating a result thereof;

(i) a second area comparison operation step of calculating an area of the second differential mask pattern based on the second differential mask pattern data, and comparing the area of the second differential mask pattern with a second prescribed area, thereby generating second area comparison operation data indicating a result thereof;

(j) a fourth determination step of determining whether or not the second area comparison operation data includes the second differential mask pattern data, thereby generating fourth determination result data indicating a result thereof; and

(k) a fifth determination step of determining whether or not the corrected mask pattern data has been properly corrected based on the first determination result data, the second determination result data, the third determination result data, and the fourth determination

result data.

5. A corrected mask pattern verification method according to claim 4, wherein:

the first reduction shortens each of the sides of the first differential mask pattern by a first prescribed amount,

the first enlargement extends each of the sides of the first differential mask pattern obtained by the first reduction by a second prescribed amount,

the second reduction shortens each of the sides of the second differential mask pattern by a third prescribed amount,

the second enlargement extends each of the sides of the second differential mask pattern obtained by the second reduction by a fourth prescribed amount, and

the corrected mask pattern includes a plurality of regions,

the corrected mask pattern verification method further comprising:

(1) performing steps (a) through (k) for each of the plurality of regions,

wherein for each performance of step (1), the first prescribed amount, the second prescribed amount, the third

prescribed amount, the fourth prescribed amount, the first prescribed area, and the second prescribed area are set.

6. A corrected mask pattern verification method according to claim 4, wherein:

the first reduction shortens each of the sides of the first differential mask pattern by a first prescribed amount,

the first enlargement extends each of the sides of the first differential mask pattern obtained by the first reduction by a second prescribed amount,

the second reduction shortens each of the sides of the second differential mask pattern by a third prescribed amount, and

the second enlargement extends each of the sides of the second differential mask pattern obtained by the second reduction by a fourth prescribed amount,

the corrected mask pattern verification method further comprising:

(m) performing steps (a) through (k),

wherein for each performance of step (m), the first prescribed amount, the second prescribed amount, the third prescribed amount, and the fourth prescribed amount are each shortened by a prescribed length, and

wherein each of the shortened first prescribed amount, the shortened second prescribed amount, the shortened third prescribed amount, and the shortened fourth prescribed amount is set as a maximum correction amount based on the result obtained by step (k) which is performed each time step (m) is performed.

7. A corrected mask pattern verification method for verifying that corrected mask pattern data generated based on design mask pattern data has been properly corrected, the corrected mask pattern verification method, comprising:

(a) a graphic operation step of generating a differential mask pattern data representing an exclusive-OR of the design mask pattern data and the corrected mask pattern data;

(b) a graphic reduction-enlargement operation step of performing a reduction on the differential mask pattern data and then performing an enlargement on the differential mask pattern data obtained by the reduction, thereby generating graphic reduction-enlargement operation data indicating a graphic reduction-enlargement operation result;

(c) a first determination step of determining

whether or not the graphic reduction-enlargement operation data includes the differential mask pattern data, thereby generating first determination result data indicating a result thereof;

(d) an area comparison operation step of calculating an area of the differential mask pattern based on the differential mask pattern data, and comparing the calculated area of the differential mask pattern with a prescribed area, thereby generating area comparison operation data indicating a result thereof;

(e) a second determination step of determining whether or not the area comparison operation data includes the differential mask pattern data, thereby generating second determination result data indicating a result thereof; and

(f) a third determination step of determining whether or not the corrected mask pattern data has been properly corrected based on the first determination result data and the second determination result data.

8. A corrected mask pattern verification method according to claim 7, wherein:

the reduction shortens each of the sides of the differential mask pattern by a first prescribed amount,

the enlargement extends each of the sides of the differential mask pattern obtained by the reduction by a second prescribed amount, and

the corrected mask pattern includes a plurality of regions,

the corrected mask pattern verification method further comprising:

(g) performing steps (a) through (f) for each of the plurality of regions,

wherein for each performance of step (g), the first prescribed amount, the second prescribed amount, and the prescribed area are set.

9. A corrected mask pattern verification method according to claim 7, wherein:

the reduction shortens each of the sides of the differential mask pattern by a first prescribed amount, and

the enlargement extends each of the sides of the differential mask pattern obtained by the reduction by a second prescribed amount,

the corrected mask pattern verification method further comprising:

(h) performing steps (a) through (f),

wherein for each performance of step (h), the first prescribed amount and the second prescribed amount are each shortened by a prescribed length, and

wherein each of the shortened first prescribed amount and the shortened second prescribed amount is set as a maximum correction amount of the corrected mask pattern based on the result obtained by step (f) which is performed each time step (h) is performed.